Light Spill Report

PROJECT NUMBER:		DOCUMENT REF: BRT-TG-XX-ZZ-RP-LI-1303-S3-P01			
P01	P01 - For Review and Comment	A Elliott	G Harding	A Longman	17/09/2021
Revision	**Purpose Description**	**Originated**	**Checked**	**Reviewed**	**Date**

Project Name: Bean Tunnel

Prepared for: Tony Gee

This report has been prepared by Designs for Lighting Ltd (DFL), a specialist lighting design consultancy with experience in lighting asset surveys, adoption planning, technical analysis and lighting design for gaining adoption of third-party lighting into council ownership. Our lighting professional staff are all members of the ILP and are either Chartered or Incorporated Engineers or working towards those qualifications. All staff are Highways Electrical Registration Scheme (HERS) registered and the company is ISO 9001 accredited.

Company Profile Summary

- ISO 9001 UKAS accredited
- Institution of Lighting Professionals. “Premier Corporate member” (2 Fellows, 5 Members, 3 Associate Member and 9 Affiliates)
- Highway Electrical Registration Scheme Registered-With all relevant staff holding ECS Cards
- All Staff working to DMRB GD02/08 for the appropriate grades
- Expert knowledge of DMRB and MCHW documentation
- All key staff Engineering Council registered to CEng, IEng or EngTech Level
- Chair of the BSI Technical Panel (BS5489-1) + member of EN13201 “Road Lighting” committee

Project Notes

1. This is a brief outline of what has been carried out to minimise light spill and reduce the impacts of the proposed lighting on the surrounding sensitive ecology especially bats.
2. A 3D light spill model has been created in RELUX to show the potential extents of the light spill.
3. Fig 1 shows the potential light spill from the column mounted luminaires. These have been dimmed down to 50% output as per the proposed dimming for the luminaires from midnight to 6am. This is to match the dimming already implemented around the Bluewater site.

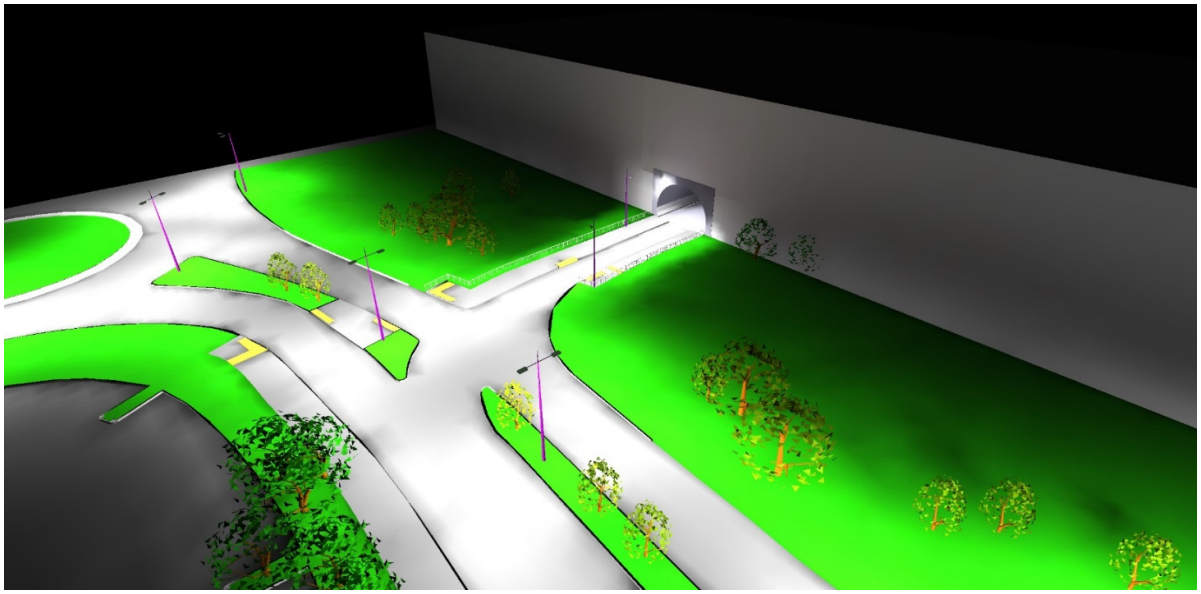

Figure 1 – Luminance Light Spill- – Tunnel Lighting Switched Off

4. Fig 2 shows the potential light spill as per Fig 1, but in Psuedo colours.

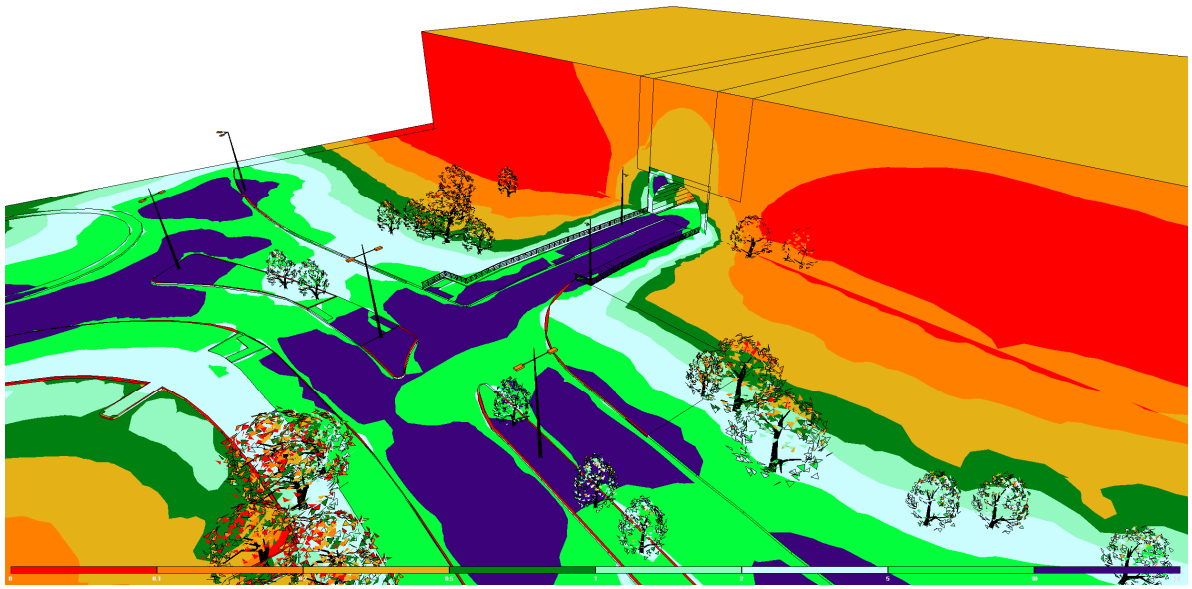

Figure 2 – Psuedo Colours Light Spill – Tunnel Lighting Switched Off

5. Fig 3 shows the Lux values associated with each colour in relation to the Psuedo colours images and will be the same for all other such images in this report.

	Lux	Colour
1	0.00	ff0000
2	0.10	ff8000
3	0.20	e4b116
4	0.50	008010
5	1.00	93f9c0
6	2.00	cbfcfe
7	5.00	03ff3c
8	10.00	3b027a

Figure 3 - Psuedo Colours Chart

6. Fig 4 shows the potential luminance light spill with the tunnel feature and functional lighting switched on and dimmed to 30% output.

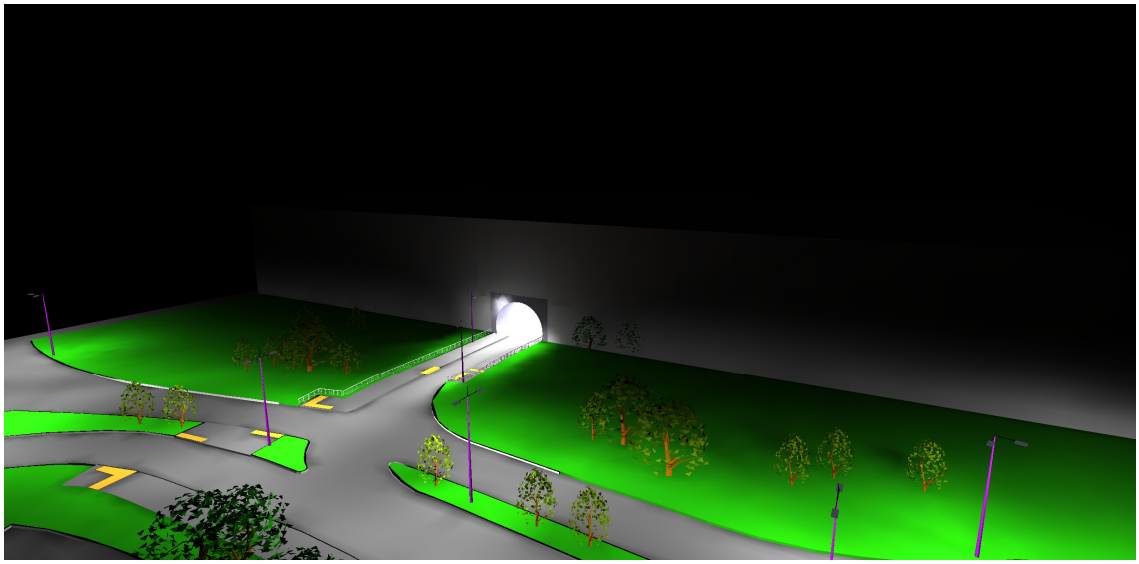

Figure 4 - Luminance Light Spill - Tunnel Lighting Switched On

7. Fig 5 shows the same as Fig 4 but in Psuedo Colours.

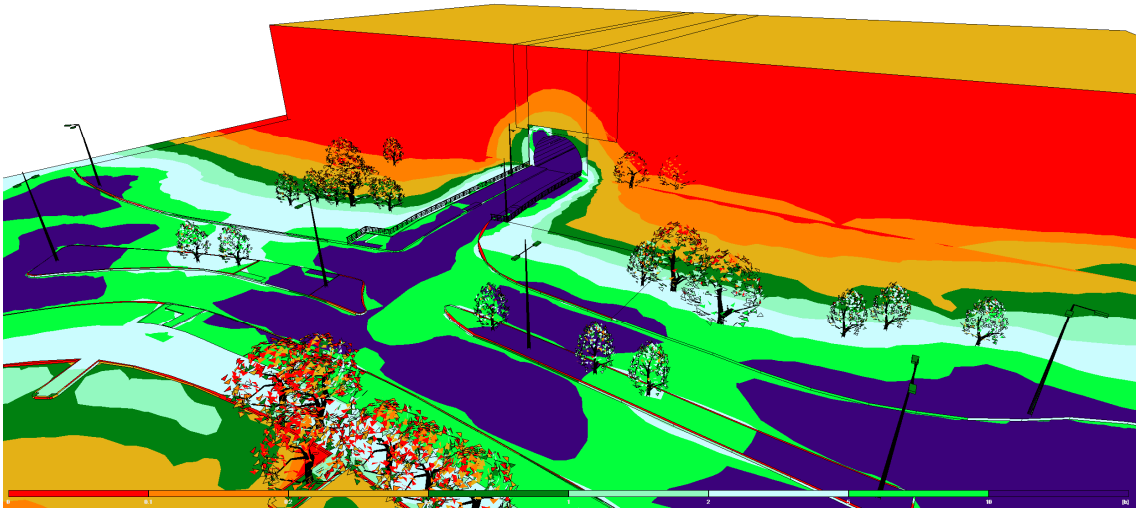

Figure 5 - Psuedo Colours Light Spill - Tunnel Lighting Switched On

8. The proposed dimming for the project is as follows.
    a. All column mounted lumianires are to be dimmed to 50% output between midnight and 6am.
    b. The tunnel feature and functional lighting will be at 90% output to achieve the day time lighting levels, and be dimmed to 30% output from dusk to dawn.
9. The Colour Correlated Temperature of the proposed column mounted and tunnel functional lighting is 4000K, this matches the existing lighting already installed around the Bluewater site.
10. The lighting levels at the tunnel entrance for daytime hours need to be at the level achieved, this is to avoid what is sometimes referred to as the black hole effect where drivers of vehicles existing the tunnel take longer for their eyes to adjust to the darker area outside the tunnel. A higher level of lighting is required to ensure that any hazards that may be present at the junction can be identified as the vehicle exits. During nihgt time hours, the tunnel levels are much closer to the adjacent street lighting levels. The tunnel lighting levels at night are for safety.
11. All proposed lighting has an LED light source.
12. The feature lighting is proposed to be a shade of blue to suit client requirements. However, the feature RGB lighting can be easily reprogrammed to produce any colour required.
13. The proposed column mounted luminimares (LC1 and LC2) lighting the new junction approaching the western tunnel entrance are to have internal full cut louvres. These greatly reduce potential light spill behind the column.

14. Fig 6 shows the light distribution for LC1 and LC2 lighting the new junction and tunnel approach. The luminanire distribution shown on the left of the image is with the full cutoff internal louvre, the image on the right is without the full cutoff internal louvre. This shows that the rear light spill has been greatly reduced with the internal louvres.

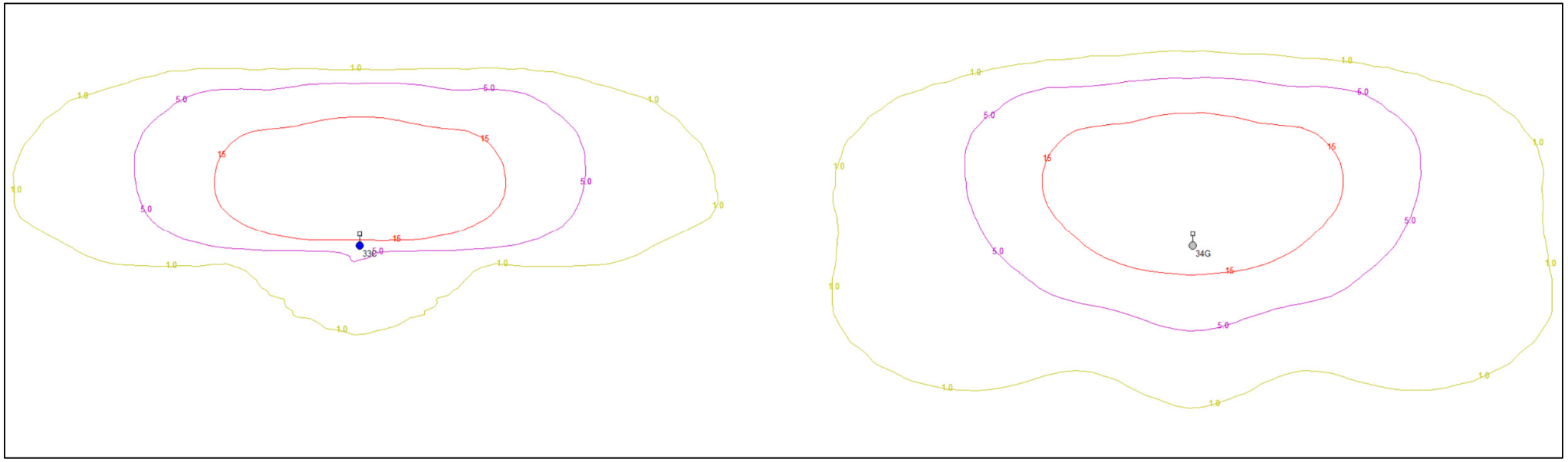

Figure 6 - Luminaires with and with out internal louvres

15. The proposed column height for LC1 and LC2 is 8 metres.
16. The proposed luminaires meet the most stringent luminous intensity class of G6. This means that there is no direct light emmtied above 90 / 95 degrees from the luminaire.
17. Figures 7 and 8 show the light spill from just the blue LED feature lighting switched on and dimmed to 30% output.
18. The blue feature lighting has been reduced in quantity since the original design. In the original design. the feature lighting started at the tunnel entrance, now, the first feature lighting unit is 4.3m from the tunnel entrance. This greatly reduces the blue light spill outside of the tunnel entrance to 0.2 Lux or less

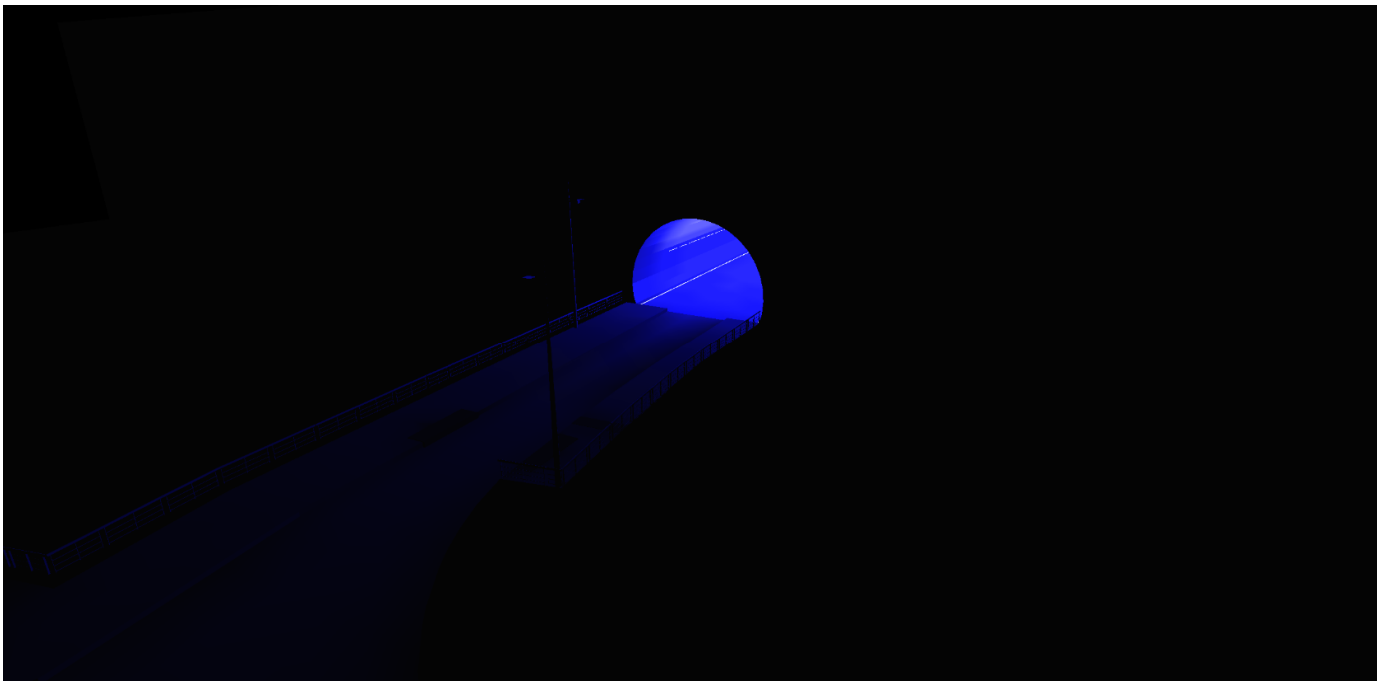

Figure 7 - Luminance LIght Spill From Feature Lighting

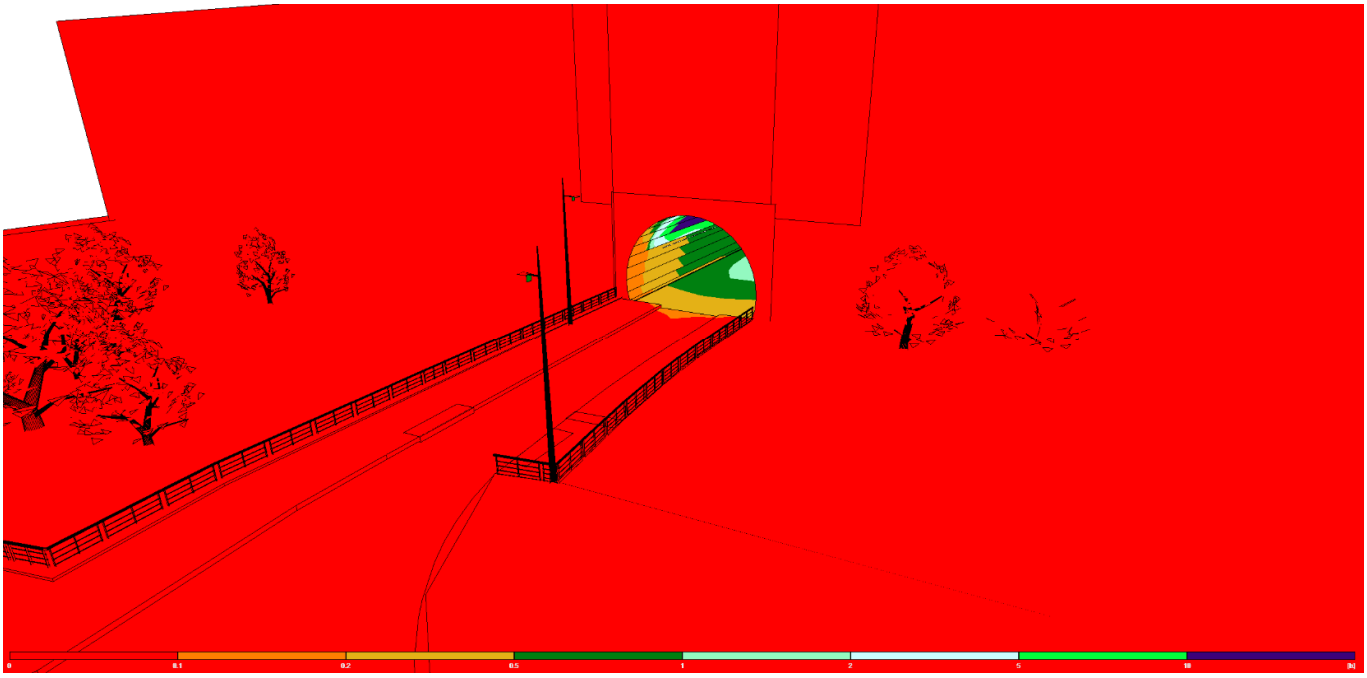

Figure 8 - Psuedo Colours Light Spill From Feature Lighting